REMARKS

Claims 1-22 are currently pending. By this Amendment, claims 1, 10, 21 and 22 have been amended. Support for the claim changes may be found at least at paragraphs 0031, 0043, and 0048 of the specification.

The Information Disclosure Statement filed December 29, 2004 has not yet been acknowledged. The Examiner is respectfully requested to acknowledge consideration of the cited references by return of an initialed copy of Form PTO 1449, attached.

In numbered paragraph 4, page 3 of the Office Action, independent claims 1, 10, 21 and 22, along with various dependent claims, are rejected as allegedly being anticipated by U.S. Patent No. 5,657,402 (Bender et al.). In numbered paragraph 6, page 4 of the Office Action, dependent claims 6, 7, 15 and 16 are rejected as allegedly being unpatentable over the Bender et al. patent in view of U.S. Patent 6,269,175 (Hanna et al.). In numbered paragraph 7, page 5 of the Office Action, dependent claims 4 and 13 are rejected as being unpatentable over the Bender et al. patent in view of U.S. Patent 6,205,259 (Komiya et al.). In numbered paragraph 8, page 5 of the Office Action, dependent claims 8, 9, 17 and 18 are rejected as being unpatentable over the Bender et al. patent in view of U.S. Patent 6,047,028 (Van Ackere et al.). In numbered paragraph 9, page 5 of the Office Action, dependent claims 5 and 14 are rejected as being unpatentable over the Bender et al. patent in view of U.S. Patent 6,556,704 (Chen). These rejections are respectfully traversed.

Applicants have disclosed methods and systems for processing imagery and enhancing visual images. The disclosed methods and systems process successive image frames (e.g., paragraph 0006) to display motion images (e.g., paragraph

0013). By correlating, spatially oversampling and registering frames (e.g., paragraphs 0031, 0045, and 0048), resolution is enhanced and temporal and spatial noise reductions are achieved to yield enhanced image output that can be dynamically generated and viewed, e.g., on a display as a streaming video. A template frame can be updated multiple times every second, thereby advantageously providing successive frames of high quality video output (e.g., paragraph 0043).

The disclosed methods and systems include re-sampling by spatially oversampling at least a portion of a given frame of image by a factor greater than one (e.g., paragraph 0048) prior to integrating the spatially oversampled portion of the aligned second frame with image data of a template frame. This allows registering the frame with a template frame by interpolating the frame using the shift vector. The template frame and the registered frame are combined to generate an averaged frame. The frame which is selected as the updated template frame for subsequent registration can be the averaged frame (e.g., paragraph 0031). By iterative registration, each previous frame's data is incorporated into the updated template, resulting in an enhanced signal to noise ratio in the processed image. The disclosed image processing also integrates out fixed pattern noise which is otherwise persistent for still image processing.

The foregoing features are broadly encompassed by Claims 1, 10, 21 and 22. For example, claim 1 recites a method for processing imagery using an Electro-Optical (EO) system. The method comprises steps of selecting a first frame of data as a template frame, capturing a second frame of data using the EO system, correlating at least a portion of the second frame with the template frame to generate

a shift vector, and registering the second frame with the template frame by interpolating the second frame using the shift vector and re-sampling by spatially oversampling at least a portion of the second frame by a factor greater than one to produce a registered frame. Claim 1 further recites re-sampling the template frame, combining the re-sampled template frame and the registered frame to generate an averaged frame, and selecting the averaged frame as an updated template frame to which a subsequently captured frame of data is registered. Claims 21 and 22 recite spatially oversampling at least a portion of aligned second frame of image data by a factor greater than one, integrating the spatially oversampled portion of the aligned second frame of image data with image data of a template frame, and processing frames of data into a continuous video stream.

The Bender et al. patent discloses a method for generating a still image (see, e.g., Abstract). In one aspect, the Bender et al. patent discloses obtaining images at differing focal lengths, scaling the focal lengths and combining the images such that part of the new image will have higher resolution than either of the original images (col. 2, lines 1-40). The Bender et al. patent discloses that the use of fixed focal length images result in a still frame of resolution and field of view no greater than that of the original high spatial resolution images (col. 2, lines 35-39). In contrast, the claimed methods and systems encompass combining images having the same focal length and same resolution, wherein frames are aligned upon over sampling one of two image frames to achieve improved resolution.

The Bender et al. patent relates to generating a still image, but does not relate to processing frames of input image data by correlating, spatially oversampling and registration of frames; and does not relate to selecting an averaged frame as an

updated template frame to which a subsequently captured frame of data is registered, as recited in claims 1 and 10. The Bender et al. patent does not teach or suggest at least re-sampling by spatially oversampling at least a portion of the second frame by a factor greater than one to produce a registered frame, as recited in claims 1, 10, 21 and 22. Further, the Bender et al. patent does not teach or suggest processing frames of data into a continuous video stream as recited in claims 21 and 22.

The Hanna et al. patent does not cure the deficiencies of the Bender et al. patent. The Hanna et al. patent discloses reducing temporal scintillation and flicker by using multiple temporal samples (col. 12, lines 4-16), but the disclosure does not relate to spatial oversampling and noise reduction. The Hanna et al. patent does not teach or suggest at least re-sampling by spatially oversampling at least a portion of the second frame by a factor greater than one to produce a registered frame, as recited in claims 1, 10, 21 and 22.

The Komiya et al. patent, the Van Ackere et al. patent, and the Chen patent do not cure the deficiencies of the Bender et al. patent. The Komiya et al. patent was applied for the disclosure of an image synthesizing circuit 121, the Van Ackere et al. patent was applied for its disclosure of temporal filtering (abstract), and the Chen patent was applied for its disclosure of depth values in a depth map (col. 4, lines 1-13). However, the applied references do not teach or suggest at least re-sampling by spatially oversampling at least a portion of the second frame by a factor greater than one to produce a registered frame, as recited in claims 1, 10, 21 and 22.

As such, Applicants' independent claims 1, 10, 21 and 22 are allowable. The remaining claims depend from independent claims 1 and 10, and recite additional

advantageous features which further distinguish over the documents relied upon by the Examiner. As such, the present application is considered in condition for allowance.

All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the application is in condition for allowance and a Notice of Allowance is respectfully solicited.

Respectfully submitted,

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Attached: copy of Form PTO 1449

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